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out almost in every section. I have no interest in calling attention to this save that of being accurately represented. Indeed, when Professor Judd's excellent ''Psychology'' came out, a cursory reading showed me that our respective views went well together on this point: but as he had not noticed it, it seemed unnecessary for me to speak of it, especially as I had then no time to read his work with care. Since, however, he now cites my views, himself finding the same position *in principle* common to his work and mine, and yet represents me as failing to see its generality and also to give it special applications, I think it only proper to say that in this he is mistaken. Of course we ''motor-men''[5] welcome so able a coadjutor, and I do not mean for an instant to imply that Professor Judd has intentionally misrepresented me. But I have now for a decade so ''harped'' upon the motor factor, both in my publications and in my lectures, that I had begun to fear that I might be called a crank on the subject.

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REVIEWS AND ABSTRACTS OF LITERATURE

Essays on Evolution, 1889–1907. EDWARD BAGNALL POULTON. Oxford: Clarendon Press. 1908.

Professor Poulton is already known to many readers through his instructive little book on "The Colors of Animals" (International Scientific Series, 1890). To the zoologist his name is chiefly identified with important work upon protective coloration and "mimicry" among insects. The present collection of essays will be of interest alike to the general reader and to the special student of evolutionary problems. An ardent champion of the doctrine of natural selection in its most uncompromising form, Poulton remains faithful, throughout these days of hostile criticism, to the orthodox interpretations of "mimicry," "warning coloration," etc. His opening chapter, the introduction, is largely devoted to a protest against those twin fads of the hour, mutation and Mendelism;[1] and more particularly against the influence of Bateson upon current English biology. That active critic and investigator, and with him his school, are indicted under six heads, of which the last three are: "The exaggerated estimate of the importance for evolution of, first, Bateson's work on variation, secondly, Mendel's interesting discovery"; "The contemptuous depreciation of other lines of investigation directly inspired by the work and teaching of Darwin and Wallace"; and "The natural consequence of the last: a wide-spread belief among the ill-informed that the teachings of the founders of modern biology are abandoned." By zoologists of this school Professor Poulton's protest will doubtless be regarded as the fulmination of a hopeless reactionary; but we believe that the unbiased reader will have a good deal of sympathy with it. And those, at least, who have seen many of their youthful idols thrown down by these same ruthless hands, will take considerable personal satisfaction in this spirited counter-attack upon the destroyers.

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[5] I recall the remark made to me in conversation by Professor Münsterberg about a decade ago to the effect—"You and I are the motor-men on the psychological electric car!" We are glad to have other motor-men with us, but we don't want to lose our own job!

[1] One may speak thus without calling in question the genuineness of certain important and well-attested facts.

It is interesting to note that while Morgan[2] finds strong support for the mutation hypothesis in the phenomena of protective and mimetic resemblance, it is precisely in this field that Poulton believes its operation to be utterly excluded. "It is as unlikely that a key could be made to fit a complicated lock by a number of chance blows upon a blank piece of metal, as that the elaborate pattern on the wings of a butterfly should have been reproduced on those of its mimic by Mutation" (p. xxiii). In a later chapter, after reciting the various methods by which transparency is brought about in the wings of those butterflies which are said to "mimic" hymenoptera, he feels warranted in declaring: "The comparison of these details is almost a demonstration of the operation of the Darwinian theory." Granting the facts as stated, they certainly do offer strong evidence for the view that the *usefulness* of the end to be attained has stood in some causal relation to its realization. And natural selection is the only (scientific) hypothesis extant which is consistent with this assumption in the present case. Is there not just a bit of overconfidence, however, in the claim (p. 267) "that, even if the theories which have been proposed as substitutes for Natural Selection have not been destroyed in single Sections of this essay—and I confidently believe that they have been thus destroyed over and over again—their most convinced supporters will admit that they must yield to the accumulated pressure of all the arguments here brought forward"? Our opponents do not commonly obey a summons to surrender as promptly as all that!

Even suppose, however, that the main contention of de Vries and the mutationists be granted, and that we admit the inability of the selection of ordinary individual or quantitative variations to raise permanently the mean of the species, "it is obvious that the variational material for evolution would be reinforced by no new category. The only effect would be to reduce the old category. The power which Darwin and others believed to reside in minute variations generally would be shown to exist in a part and not the whole of these" (p. xxxix). This criticism would evidently not apply to mutations of considerable magnitude, for the occurrence of great and abrupt modifications might obviate the acknowledged difficulty regarding the "pre-useful" stages of organs. It is true, we have no satisfactory evidence for such a sudden method of acquiring useful structures.

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[2] "Evolution and Adaptation."

After a brief discussion of the phenomena of Mendelism and the claims of the Mendelians, he writes: "I should be the last to undervalue these results, but their true worth is not enhanced by such astonishing exaggeration as that which appears in the passage I have quoted. . . . The human mind is so constituted that a touch of megalomania is to be expected, is even to be regarded with sympathy, in the first flush of a new victory over the unknown. . . . But to suppose that the problem of evolution is thereby solved, or is likely to be solved, is unreasonable" (p. xxxiii). And again: "It is probable that the part played by Mendel's principle in evolution is limited to the prevention, in certain cases, of the supposed 'swamping effect of intercrossing'" (p. xxxiv).

The succeeding chapters (the "essays" proper) are ten in number, dealing, respectively, with "A Naturalist's Contribution to the Discussion upon the Age of the Earth"; "What is a Species?"; "Theories of Evolution"; "Theories of Heredity"; "The Bearing of the Study of Insects upon the Question 'Are Acquired Characters Hereditary?'"; "A Remarkable Anticipation of Modern Views on Evolution"; "Thomas Henry Huxley and the Theory of Natural Selection"; "Natural Selection the Cause of Mimetic Resemblance and Common Warning Colors"; "Mimicry and Natural Selection"; and "The Place of Mimicry in a Scheme of Protective Coloration." They are arranged in a logical, rather than a chronological, order. Only one (the last) was written for the present volume, though many have been revised and modified. The essays are of very unequal value, and there is, as would be expected, considerable overlapping and repetition.

The author's own standpoint, it is scarcely necessary to repeat, is "straight" natural selection. Lamarckism is rejected after considerable discussion and the presentation of some very forceful, if not wholly new, objections. The treatment throughout the volume is that of a partisan rather than of a judicial critic, though, on the whole, it is moderate in tone. The following sentence will doubtless arouse instant dissent in the minds of many biologists: "The more we study the characters of animals in general, even though we at first can see no utility, the more we come to admit this principle, and to believe that either now or in some past time the characters have been useful" (p. 106). He means, apparently, *all characters.* Had he said *most characters,* or the *fundamental characters,* there would have been no room for difference of opinion. Such claims, moreover, are not necessary to the theory of natural selection, nor do we grant that "if inutility could be proved for any large class of characters, the theory would certainly be destroyed as a wide-reaching and significant process" (p. 107). It may well be that the superficial "diagnostic" characters of the taxonomist are largely useless to the organism, as has been frequently asserted of late. We must concede, nevertheless, that in matters of bionomics the opinion of a well-trained naturalist, having a "speaking acquaintance" with a myriad of living forms, is worth vastly more than that of the average paraffin-imbedding, section-cutting, oil-immersion type of biologist, who is not over-particular as to just what species he borrows his material from, and who does not always seem to bear in mind that living organisms are just as much realities as are (stained) cells and nuclei.

Essay number VI. deals with little-known and extremely interesting facts in regard to an English anthropologist, James Cowles Prichard, who, more than eighty years ago,[3] anticipated the now dominant views regarding the inheritance of acquired characters. Indeed, his utterances on this subject have such a distinctly modern sound that I can not forbear following Poulton in quoting from them. "It appears to be a general fact," writes Prichard, "that all connate varieties of structure, or peculiarities which are congenital, or which form a part of the natural constitution impressed on an individual from his birth, or rather from the commencement of his organization, whether they happen to descend to him from a long inheritance or to spring up for the first time in his own person—for this is, perhaps, altogether different—are apt to reappear in his offspring. It may be said, in other words, that the organization of the offspring is always modeled according to the type of the original structure of the parent.

"On the other hand, changes produced by external causes in the appearance or constitution of the individual are temporary, and, in general, acquired characters are transient; they terminate with the individual and have no influence on the progeny."

And these theoretic statements are supported by some of the well-known arguments. It must be added, however, that Prichard was not consistent in his adherence to these views and that the latter, together with some interesting foreshadowings of the evolution theory, were suppressed in later editions of his work.

Naturally the various phenomena of protective coloration and mimetic resemblance take a leading place in the volume at hand. The author regards the original "mimicry" theory of Bates as largely (but not wholly) supplanted by the theory of "common warning coloration" ("synaposematic coloration," in Poulton's language) originated by Fritz Müller. The former recognized only the imitation of offensive, and therefore "warningly" colored, insects by supposedly inoffensive and edible ones. According to the latter hypothesis, the "mimics" may be, and commonly are, likewise offensive. The ill-flavored, or otherwise repellant, insects of a given region—so the theory runs—adopt a common type of warning coloration. Thus the insect-eating animals of this geographical section learn to distinguish objectionable forms more readily than if a different "danger signal" had to be learned anew for each species encountered It is needless to add that all these color patterns are supposed to have been acquired through the natural selection of advantageously colored individuals, without any conscious efforts on the part of the insects.

It is well to note, however, that the very existence of "warning" coloration has recently been called in question, and that by no means all biologists agree as to the significance of the facts of mimetic resemblance. Poulton and those of his manner of thinking have the advantage of offering an explanation which is at least intelligible, however great a tax it may impose on the imagination. And they have the advantage—and a great one!—of a first-hand acquaintance with the facts in question. It is easy enough to write with flawless logic against the existence of one or another type of protective resemblance, while seated in the seclusion of one's study; but in this case, as elsewhere, it is apt to be true that "seeing is believing."

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[3] "Researches into the Physical History of Mankind," 2d edition, 1826.

It would seem futile, however, in the present uncertain condition of our knowledge in this field, to draw up such an elaborate classification of adaptive colors as Poulton here offers us. Some four types and ten subtypes are distinguished, according to their hypothetical significance in the bionomics of the animal, each distinguished by a descriptive name of Greek origin. This strikes us as a little premature. Who can tell but many of these rather uncouth words will prove to be stillborn? We also wonder whether Poulton has always been duly critical in accepting the statements and interpretations of others. Many alleged illustrations are offered us of one or another of the phenomena under discussion, for which one more sceptical on this subject would certainly have demanded better evidence than is here offered us. We have in mind, for example, that remarkable lepidopterous larvæ (p. 253) the front part of whose body has been moulded by natural selection into close resemblance to an ant, while the remainder of the body represents some burden which the hypothetical ant is dragging after it! We should like to know, also, whether the current statement (cited by Poulton) as to the existence of a phosphorescent "lure" in the case of certain deep-sea fishes is anything more than a surmise. Experiment, or even direct observation, showing the real function of this organ, is, of course, out of the question, and it is more than possible that even the phosphorescence of the tentacle has merely been inferred from its structure. (The reviewer does not have access to the original descriptions.) Nevertheless it is stated, without any qualification, that the fishes in question "have a phosphorescent lure attractive to the other fish on which they feed" (p. 378). Perhaps they do, but is this anything more than a plausible surmise? In general, we think that, throughout the volume, the distinction has not always been carefully drawn between fact and interpretation. We are disappointed, too, by the slight mention of such experimental evidence as exists for the reality of warning coloration among animals.

Now and then we meet with what sounds like a bit of vicious teleology, though the author would doubtless repudiate such an interpretation of his words. Referring to the faithfully figured "fungus spots" upon the wing of the leaf butterfly (Kallima), he tells us that "these tall, black scales doubtless represent [*sic*], in form as well as in colour, the fructification in the centre of a patch of leaf-attacking fungus, perhaps the very kind which at a later stage of development produce the holes suggested by the 'windows' on another part of the wing surface" (p. 206). The endeavor to translate this statement into terms of natural selection, regarded merely as the survival of the fittest, seems to the reviewer to reveal grave difficulties, either in that theory itself or in Poulton's interpretation of these particular facts.

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The Psychology of Advertizing: A Simple Exposition of the Principles of Psychology in Their Relation to Successful Advertizing. WALTER DILL SCOTT. Boston: Small, Maynard & Co. 1908. Pp. 269.

This handsome book, whose mechanical make-up illustrates Professor Scott's theory of advertizing, is dedicated to "that increasing number of American business men who successfully apply science where their predecessors were confined to custom." The publishers advertize the book as "an indispensable business-building book." The first eleven chapters give a simple outline of such processes as memory, feelings, instincts, suggestion, will, habit, laws of progressive thinking. The next four chapters are more special: XII., "Attention Value of Small and of Large Spaces"; XIII., "Mortality Rate of Advertizing"; XIV., "The Psychology of Food Advertizing"; XV., "The Unconscious Influence in Street Railway Advertizing." Chapter XVI. discusses the "Questionnaire Method, Illustrated by an Investigation upon Newspapers." Chapter XVII. concludes the book with a useful bibliography. The book has no index, but includes a list of illustrations, which are mostly facsimiles of actual advertisements.

Professor Scott writes interestingly, and it is not unlikely that some business men may be attracted to psychology by a practical study that appeals to a strong practical interest. The illustrations of advertizing are drawn for the most part from the advertizing sections of popular illustrated magazines of the better sort. It is to be hoped that Professor Scott's interest in applied psychology will stimulate other psychologists to test the value of their theories by means of practical observation and experiment. Since 1900 our author has been writing, not only on the theory and psychology of advertizing, but also on such subjects as the psychology of impulse and the psychology of public speaking.

As a rather surprising sign of the times, one notes that the author marshals a "selected list of the best books on advertizing" that includes forty titles in English and mentions twenty-three American magazines devoted to advertizing. Psychologists would be interested in corresponding lists for England, France, Germany, Japan, and other countries that believe "it pays to advertize." The bibliography also gives us twenty-two titles of "books on psychology which are most helpful to business men." This particular list would most likely undergo some revision if it were voted on by psychologists and business men generally. For instance, Wundt's "Outlines of Psychology" can hardly be considered popular enough for the average man interested in plain-sailing applied psychology. Over a hundred titles of articles on advertizing found in non-technical journals add to our impression that there is a wide-spread interest in advertizing and its psychology. Inquiry about business men's actual